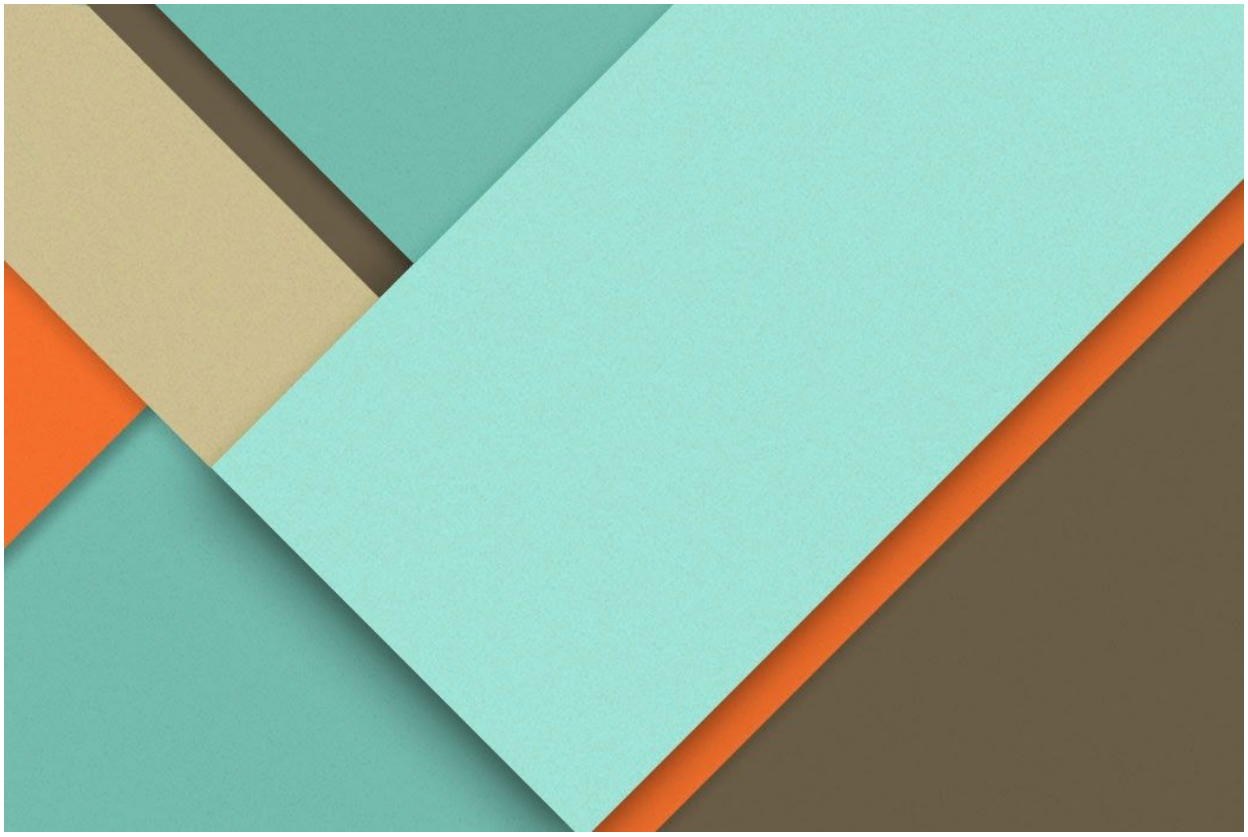

Mapping ER Diagram to Relational Model and subsequent conversion to 3NF

Data and Applications Project Phase-3

Team Turing

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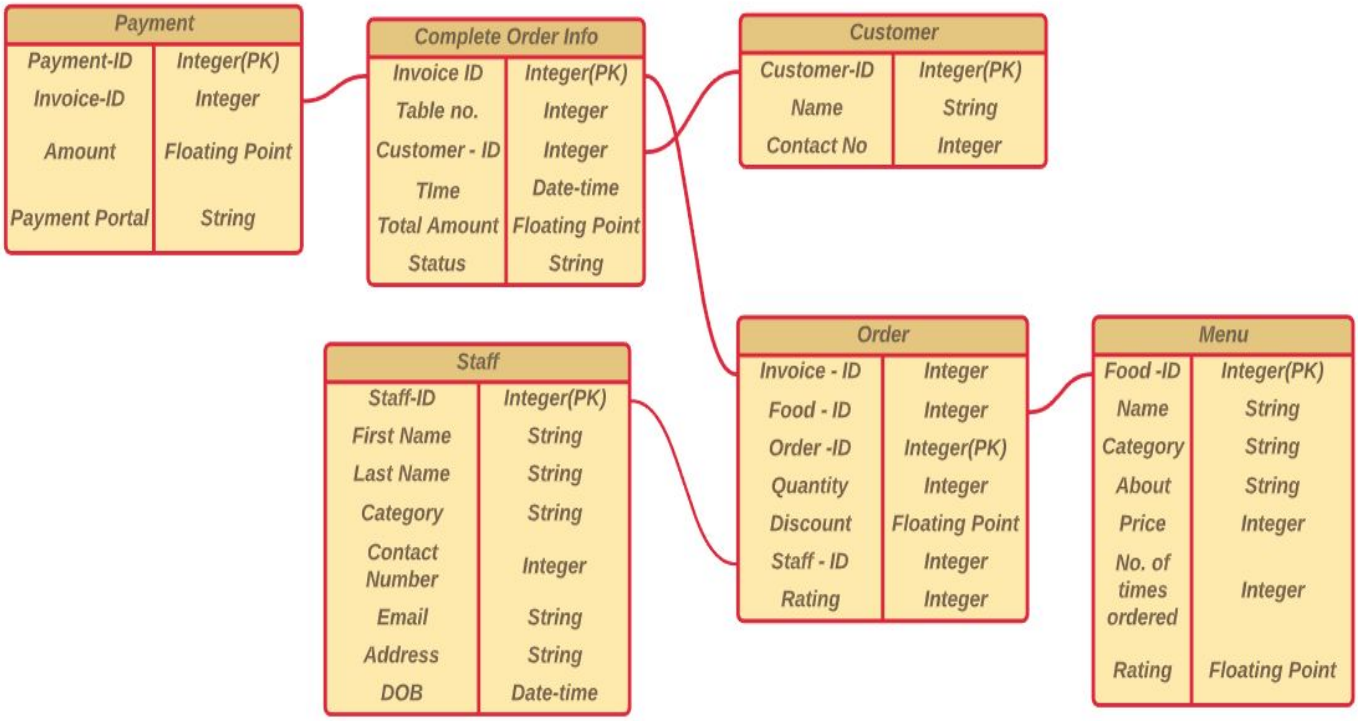
Modifications in the ER Model

- No need for Age attribute in Staff as D.O.B serves the purpose.
- No need for a separate Total Salary attribute in Salary.

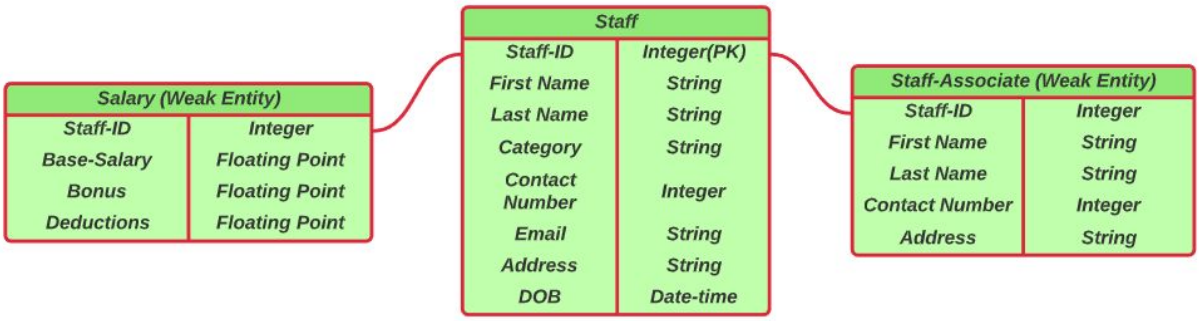
Mapping ER Model to Relational Model

- Step 1: Mapping of Regular Entities



All the entities are mapped by their primary keys

- ## Step 2 : Mapping of Weak Entities



Staff-ID is the identifying attribute for both Salary and Staff-Associate.

- ## Step 3: Mapping of Binary 1:1 Relationships types

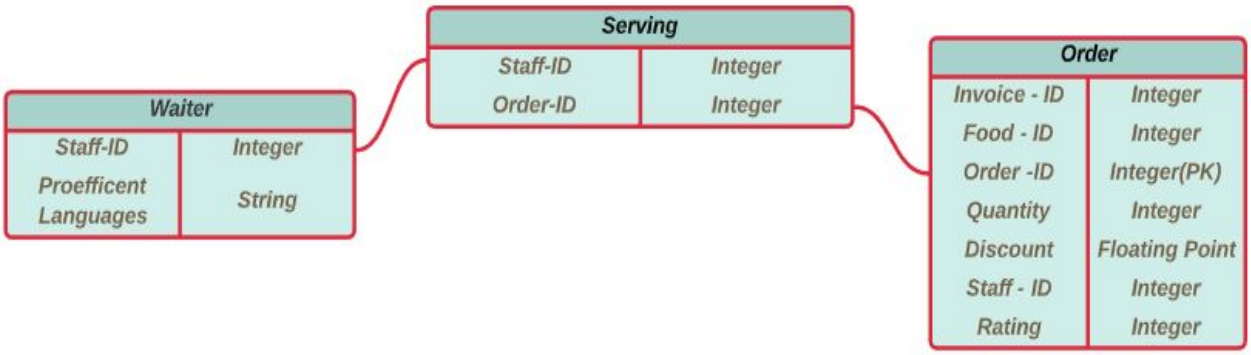
- No such relationship type exists.

- ## Step 4: Mapping of Binary 1:N Relationships types

- We use foreign keys to establish relations.
- The relationships are:

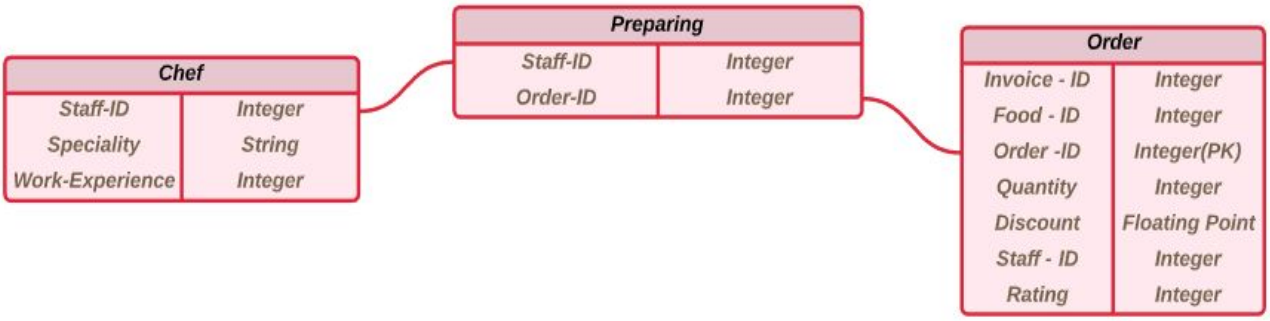
1.) ***Serving*** : Waiter is serving an order.

Staff-ID and Order-ID will be foreign keys.



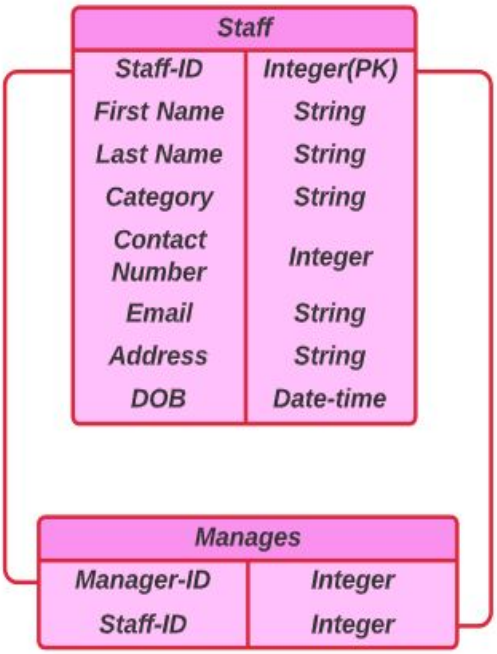
2.) ***Preparing***: Chef is preparing an order.

Staff-ID and Order-ID will be foreign keys.



3.) ***Manages***: Manager manages other employees.

Manager-ID and Staff-ID will be foreign keys.

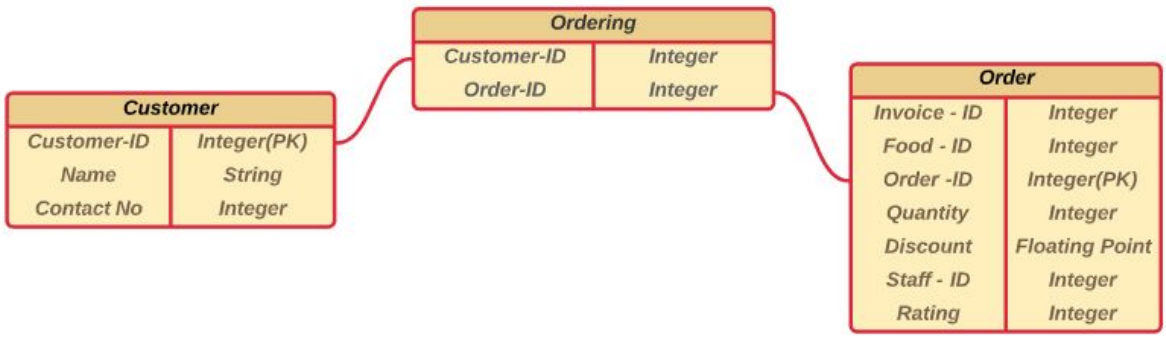


- ## Step 5: Mapping of Binary N:M Relationships types

- We use foriegn keys to establish relations.
- The relationships are:

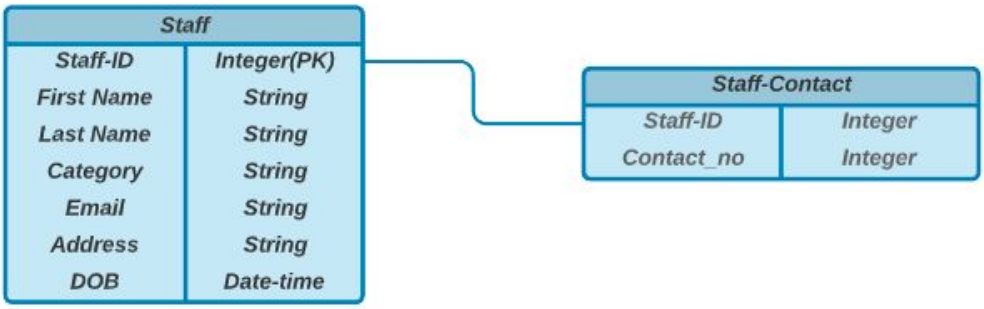
1.) ***Ordering***: Customer is placing an order from the menu.

Customer-ID and Food-ID are foreign keys.

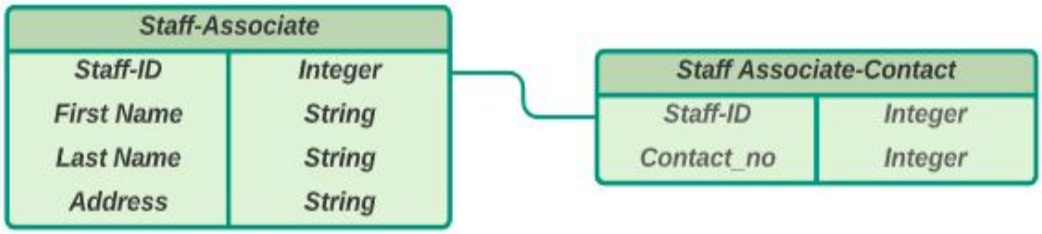


- ## Step 6: Mapping of Multi-valued Attributes

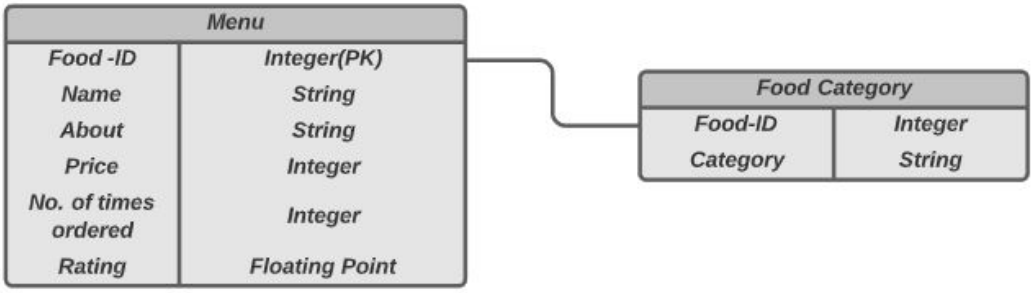
1. ***Staff :*** Contact_no is a multivalued attribute.



2. ***Staff Associate :*** Contact_no is a multivalued attribute.



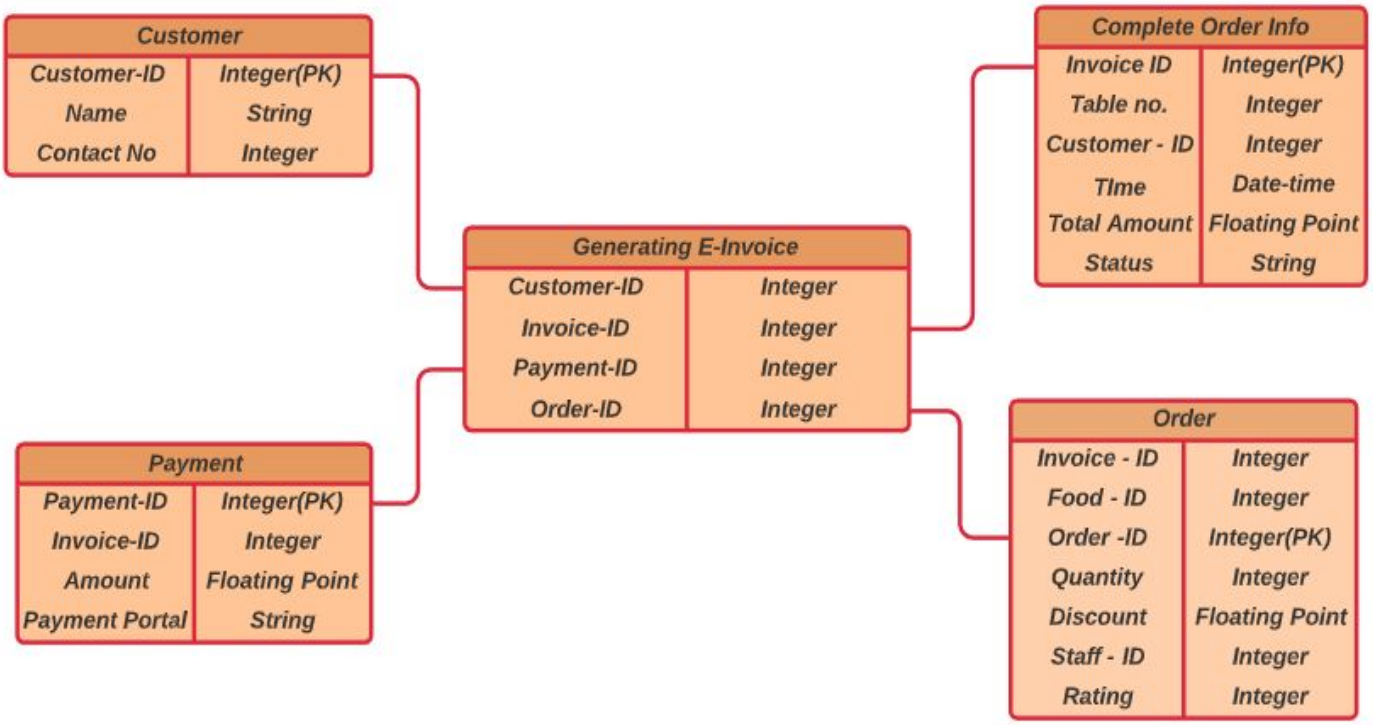
3. ***Menu:*** Category is a multivalued attribute.



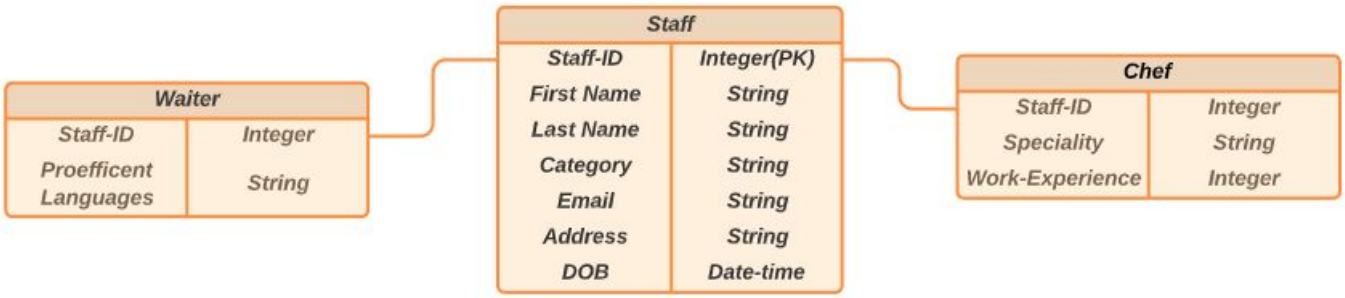
- ## Step 7: Mapping of N-ary Relationships

We have one **4-degree relation**.

Generating E-Invoice: Between Customer, Order, Payment and Complete Order Info.



- ## Step 8: Mapping specialization or generalisation
- There are two specializations in our model, Chef and Waiter both belong to superclass Staff , So we should have a new relation for subclasses chef and waiter, which include primary key of its superclass Staff.



- ## Step 9: Mapping of Union Types

No such type exists.

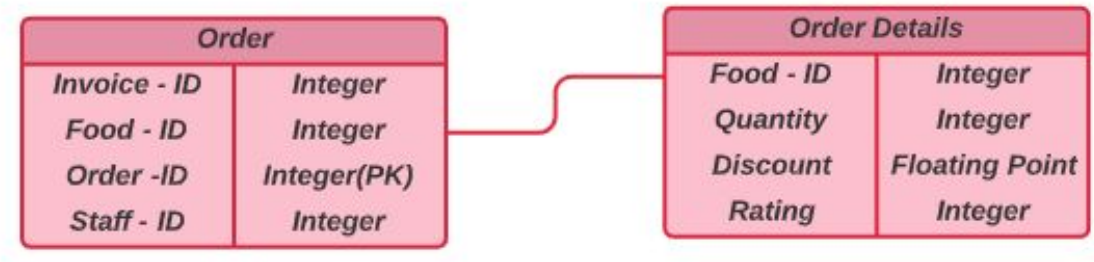
Conversion of Relational Model to 1NF

The Relational Model is already in 1NF. (Refer to Step 6)

Conversion of 1NF to 2NF

1. Order

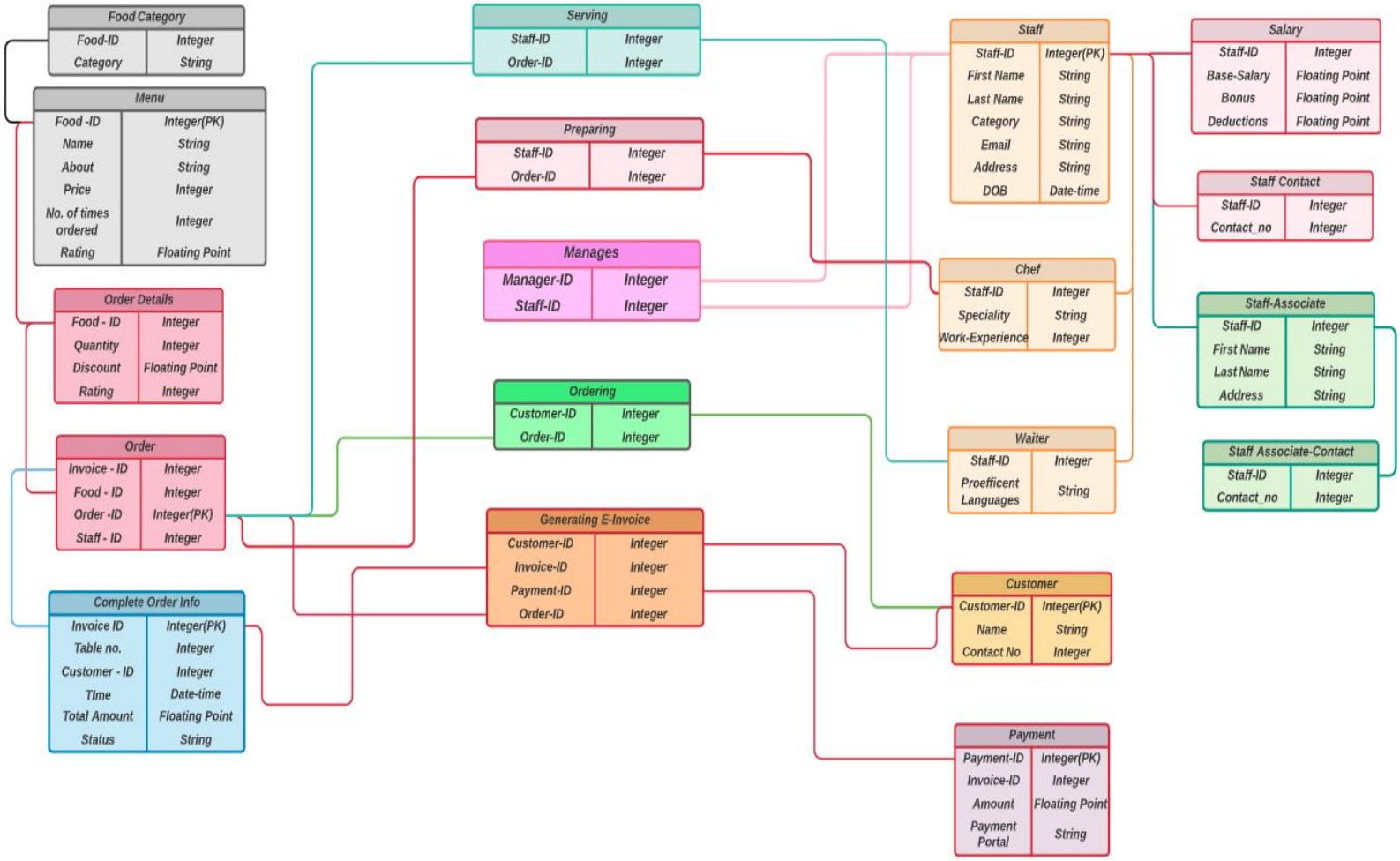
   We set Order-ID as Super Key as <Invoice-ID , Food-ID , Staff-ID>.



Conversion of 2NF to 3NF

The Relational Model is already in 3NF.

Complete 3NF Relational Model:



Example Tables:

1. STAFF

Staff-ID	FName	Lname	Email	Address	Dob	Category
178	Robert	Lincoln	rob.linc7@gmail.com	22nd, West Street, LA	07.11.92	Waiter

160	John	Ray	jray.02@gmail.com	17 Raven Street, LA	15.04.90	Chef

Staff-ID	Contact no
178	0112447987
160	0112453459

2. STAFF ASSOCIATE

Staff-ID	Fname	Lname	Address
178	John	Wick	221B Bakers Street, London
160	Mary	Jane	17, Queens, NY

Staff-ID	Contact no
178	912122345678
160	912547987154

3. CHEF

Staff-ID	Work experience	SpecialityStaff
160	21	Continental

4. WAITER

Staff-ID	Language

178	English

5. SALARY

Staff-ID	Base Salary	Bonus	Deductions
178	3600	600	45
160	4200	550	0

6. MENU

Food-ID	Name	About	Price	No of times ordered	Rating
12	Naple's Special Pizza	Thin crust pizza, with loads of veg toppings and cheese	24.50	45	4.6
65	Choco Frappe	Light Refreshing drink	15.00	78	4.7

Food-ID	Category
12	Italian
65	Milk Product

7. CUSTOMER

Customer-ID	FName	LName	Contact Number
75418	Elon	Musk	9197854864
24516	Sundar	Pichai	9744643513

8. ORDER

Invoice-ID	Food-ID	Staff-ID
12345	12	160

Food-ID	Discount	Quantity	Rating
65	5	2	5

9. COMPLETE ORDER INFO

Invoice-ID	Customer-ID	Table Number	Time	Total Amount	Status
12345	75418	2	17:48 02-03-20	44	Served

10. PAYMENT

Payment-ID	Invoice-ID	Amount	Portal
78354686	12345	44	PayPal